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Supramolecular motifs for the self-assembly of monosubstituted pillar[5]arenes with an amide fragment: from nanoparticles to supramolecular polymers

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Abstract

© The Royal Society of Chemistry and the Centre National de la Recherche Scientifique. Monosubstituted pillar[5]arenes with an N-alkylcarbamoyloxymethyl fragment were successfully prepared by aminolysis with good yields. One- and two-dimensional NMR spectroscopy clearly indicated that the inclusion of the alkyl substituent in the macrocyclic cavity is typical of the synthesized compounds. According to 1H and 1H-1H NOESY NMR data, only four carbon atoms of the alkyl fragment (-NHCH2CH2CH2CH2-group) are included in the macrocyclic cavity regardless of the alkyl chain length. The formation of an intramolecular hydrogen bond between the NH proton and the oxygen atom of the oxymethylene fragment was confirmed by IR spectroscopy. On the basis of nanoparticle trajectory analysis and transmission electron microscopy data, the aggregation of the new synthesized derivatives of pillar[5]arene varied from supramolecular polymers in chloroform to spherical nanosized aggregates in DMSO. The length of the substituent had no effect on the size of the aggregates formed in DMSO, whereas a direct correlation was established between the substituent length and the size of the supramolecular polymer formed in chloroform.

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